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hardly agree with the statement (p. 158) that "flowers are the organs of sexual reproduction in plants," nor in the light of recent work done in physiological chemistry, can they affirm that "the physical attributes of air, water, and of the gases and metals used in the physical apparatus *can never* explain qualities like nutrition, respiration, growth, irritability, and reproduction." Only a teleologist or a poet would feel justified in saying that a membrane "has the power of decision whether a substance may or may not enter a cell." Occasionally one finds an error that has escaped the proof reader and is misleading. For example (p. 442) the embryo sac is described as "consisting of six cells which are formed in groups of three at each pole." Although these petty criticisms might be multiplied, they are inconsequent and need not be noted when the scope and high quality of the book as a whole is concerned.—FLORENCE M. LYON.

Ferment organisms.

THE TRANSLATION by Allan and Millar of Klöcker's book *Gärungsorganismen* (1900)* renders this work accessible to all English-speaking students, and places a valuable text-book in the hands of those interested in the microbiology of fermentation industries. In the discussion of ferment organisms and the history of their relation to industry, two names stand out with especial prominence, those of Pasteur and Hansen. Pasteur's discovery that bacteria were responsible for the diseases of fermented liquids led to the prevention of external infection, but could not be fruitful until Hansen had made practical application of his methods of distinguishing and securing pure yeast-cultures. In any text-book on fermentation organisms the results of investigations in the Carlsberg laboratory must therefore form an important part, and Klöcker, for years the assistant and distinguished associate of Hansen, is especially fitted to present these results.

The book is divided into three sections. The first of these, pp. 1-15, is introductory and historical; the second, pp. 16-169, describes the fittings and methods of a zymo-technical laboratory, with especial attention to the preparation of pure yeast-cultures, to Hansen's methods for preservation of yeasts, for preparation of spore-cultures, for analysis of top and bottom yeasts, and to his pure-culture system as applied to various fermentation industries. The third section, pp. 170-345, gives a brief but excellent systematic description of Eumycetes, including a general discussion of the structure, development, fermentation phenomena, adaptability, variation, and circulation in nature of Saccharomycetes. The text ends with a short description of those fission fungi which are related to alcoholic fermentation. Each section has its separate bibliography, and though this plan necessitates some repetition of titles, the critical and historical notes by the author on the more important works give the lists unusual interest and value.

* KLÖCKER A., *Fermentation organisms, a laboratory hand-book*. Translated from the German by G. E. ALLAN and J. H. MILLAR. 8vo. pp. xx+392. *figs.* 146. London and New York: Longmans, Green & Co., 1903.

Although, like the briefer work of Jorgensen on the same subject, this book deals particularly with the malting and brewing industries, it will find an important place in many laboratories, both as a complement to the textbooks which treat the chemical side of fermentation and as a systematic reference book.—MARY HEFFERAN.

Ferns.

THIS ELEGANT VOLUME³ is intended primarily for amateurs and consequently is as free as possible from technicalities. An analytical key based upon the stalks is a principal feature of the book. In this key, the number of vascular bundles appearing in a transverse section of the stalk is the most important character. The chief divisions are those in which the cross section shows one, two, three, four, five, and more than five bundles, respectively. Other stem characters, such as the grooves, ridges, and color are prominent. There is also a key based upon the fructification. All the ferns of the northeastern states are figured and described, there being more than three hundred photographs, all of which are original. The photographs of sori, most of which are taken at a magnification of 5.5 diameters, are exceptionally fine and will be valuable not only to the amateur who is learning to identify ferns, but also to the teacher, who will find them useful in demonstration. In photographing the sori, a camera with a bellows extension of twenty-four inches was used, and the focal length of the lens was reduced by slipping over it a cheap copying and enlarging lens, thus giving the desired magnification.

While the book is addressed to amateurs and is written in popular style the author's acquaintance with ferns in the field, together with the peculiar key and excellent illustrations, will make it useful to the experienced botanist.—C. J. CHAMBERLAIN.

MINOR NOTICES.

PART 17 of Engler's *Das Pflanzenreich*, a volume of 326 pages, treats the Lythraceae by E. Koehne.⁴

GREEN⁵ has revised his *Forestry in Minnesota*⁶ and made it more applicable for general use. A very valuable part of the volume is a tabular classification of what is known of the silvicultural habit and uses of the

³ WATERS, CAMPBELL E., *Ferns, a manual for the northeastern states*, with analytical keys based on the stalks and on the fructification. 8vo. pp. ix+362. Illustrated, New York: Henry Holt & Co. 1903. \$3.

⁴ ENGLER, A., *Das Pflanzenreich. Regni vegetabilis conspectus. Heft 17. Lythraceae*: E. Koehne. 8vo. pp. 326. *figs.* 59. Leipzig: Wilhelm Engelmann. 1903. *M* 16.40.

⁵ GREEN, H. C., *Principles of American forestry*. 12 mo. pp. xiii+334. *figs.* 73. New York: John Wiley & Sons. 1903. \$1.50.

⁶ BOT. GAZ. 34: 455. 1902.